

[51] I/We Claim:

1. A front-lit display panel comprising:
 - (a) a plurality of pixels units, each pixel unit having:
 - (i) a layered structure including a sequence of a transparent conductor, an active layer containing liquid-crystal-type molecules, and a rear conductive layer, parts of said pixel unit which lie on a side of said rear conductive layer remote from said active layer being designated as the "rear portion" of said pixel unit,
 - (ii) a first electrical connector in electrical contact with said rear conductive layer and extending to the rear portion of said pixel unit, and
 - (iii) a second electrical connector in electrical contact with said transparent conductor and extending to the rear portion of said pixel unit; and
 - (b) a plurality of electronics module for respectively receiving each pixels units, each said module having
 - (i) a first conformal interconnection facility with the at least two contacts adapted for making electrical contact with said first and second electrical connectors of one of said pixel unit, and
 - (ii) a second conformal interconnection facility for interfacing with at least one data communications line and at least one electric power line; and
 - (c) an assembly board for receiving said plurality of second conformal interconnection facilities, each receiving position having at least two contacts respectively adapted for making electrical contact with said data communications line and with electric power line of one of said electronics modules.
2. The display panel of claim 1, wherein said active layer contains a material selected from the list: a colored dye and a colored pigment.
3. The display panel of claim 1, further comprising a colored filter positioned in front of said transparent conductor.

4. The display panel of claim 1, wherein said active layer includes PDLC material.

5. The display panel of claim 1, wherein said active layer includes chiral nematic liquid crystal material.
6. The display panel of claim 1, wherein said assembly board has a plurality of sockets, one of said sockets being located at each of said module receiving positions, and wherein the rear portion of each module includes a conformal interface shaped for engaging one of said sockets.
7. The display panel of claim 1, wherein said first and second connectors include connecting strips associated with a conformal interface port of the respective module.
8. The display panel of claim 1, wherein said rear conductive layer is transparent, and wherein the rear portion of said pixel unit includes a material selected from the list: a black backing, an opaque backing, a partially reflective backing, a fluorescent backing, a dichroic backing, a reflective backing, an active optically illuminating backing, and an active ultraviolet illuminating backing.
9. The display panel of claim 1, wherein said plurality of pixel units, includes a first group of pixel units in which said active layer assumes a relatively high reflectivity state in which a first color is reflected, a second group of pixel units in which said active layer assumes a relatively high reflectivity state in which second color is reflected, and a third group of pixel units in which said active layer assumes a relatively high reflectivity state in which a third color is reflected.
10. The display panel of claim 1, wherein one of said transparent conductor and said rear conductive layer is subdivided into a plurality of discontinuous regions, each of said regions being provided with a separate electrical connector in electrical contact with said region and extending to the rear portion of said pixel unit.

11. The display panel of claim 10, wherein said regions are arranged in a two dimensional array, one of said dimensions corresponding to two of said regions.
12. The display panel of claim 1, wherein said layered structure of each of said pixels further includes:
 - (a) an intermediate transparent conductor and a second active layer containing liquid-crystal-type molecules, said intermediate transparent conductor and said second active layer being located between said first-mentioned active layer and said rear conductive layer, and
 - (b) a third electrical connector in electrical contact with said intermediate transparent conductor and extending to the rear portion of said pixel unit.
13. The display panel of Claim 1 wherein the pixel unit is detachable from the electronics module and the electronics unit is substantially integral to the assembly board.
14. The display panel of Claim 1 wherein the pixel unit is substantially integral to the electronics module and the electronics unit is detachable from the assembly board.
15. The display panel of Claim 1 wherein the pixel unit is detachable from the electronics module and the electronics unit is detachable from the assembly board.
16. The display panel of Claim 1 wherein the pixel unit of a single multilayered pixel having predetermined dynamic optical properties in each layer.
17. The display module of Claim 16 wherein the electronics module receives a plurality of pixel units.

18. The display module according to Claim 1 wherein the pixel unit is connected to the electronics module using a flexible cable.
19. The display module according to Claim 1 wherein the electronics unit is connected to the assembly board using a flexible cable.
20. The display module according to Claim 1 wherein the electronics module includes at least one data communications interface to at least one neighboring electronics module on the assembly board.
21. The display module according to Claim 1 wherein the electronics module includes at least one electrical interface to at least one neighboring electronics module on the assembly board.
22. The display module according to Claim 1 wherein the electronics module includes a programmable microprocessor.
23. A display module computer program product including a computer usable medium having computer readable program code embodied therein for transferring data communications related to a current display state from an electronics module of a front lit display panel to an adjacent electronics module on the front lit display panel, the computer readable program code in said program including:
 - (a) first computer readable program code for causing a computer to schedule transfer of a current state of pixel unit associated with an electronic unit;
 - (b) tied to the first computer readable software, second computer readable program code for causing the computer to transfer the current state of pixel unit from the respective associated electronic unit to a first adjacent electronics unit; and

(c) tied to the first computer readable software, second computer readable program code for causing the computer to accept a current state of a pixel unit from a second respective associated adjacent electronic unit.

24. The display module computer program product according to Claim 23 wherein the electronics unit is between the first adjacent electronics unit and the second adjacent electronics unit.

25. A front-lit color display panel comprising at least one pixel unit, each pixel unit having a layered structure including a sequence of: a transparent conductor, an active layer containing stabilized chiral nematic liquid crystal, and a rear conductive layer, and wherein said at least one pixel unit includes a pixel element in which said stabilized chiral nematic liquid crystal assumes a reflective state in which a predetermined color is reflected.

26. The display panel of claim 25, wherein said rear conductive layer is transparent, and wherein the rear portion of said pixel unit includes a material selected from the list: a black backing, an opaque backing, a partially reflective backing, a fluorescent backing, a dichroic backing, a reflective backing, an active optically illuminating backing, and an active ultraviolet illuminating backing.

27. The display panel of claim 25, wherein one of said transparent conductor and said rear conductive layer is subdivided into a plurality of discontinuous regions, each of said regions being provided with a separate electrical connector in electrical contact with said region and extending to the rear portion of said pixel unit.

28. The display panel of claim 27, wherein said pixel units are arranged such that each of said regions of a pixel unit of said first group is adjacent to one of said regions of a pixel unit from each of said second and third groups.
29. The display panel of Claim 25 wherein the liquid crystal includes a material selected from the group: a dye and a pigment.